

Cosolvent Effect on the Solubility of Heavy Hydrocarbons in Supercritical CO₂

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The solubility of hydrocarbons in a supercritical solvent can be enhanced with changes in pressure or temperature as well as by adding a substance called a cosolvent or entrainer. Then, the industrial potential of extraction of hydrocarbons with supercritical CO₂ can be improved through the use of cosolvents.

In previous work, we have determined the solubility of n-octadecane in CO₂ and n-eicosane in CO₂ at 310, 313, 333 and 353 K in the pressure range 10 to 20 MPa. In this work, we report on the effect of a cosolvent on the solubility of n-octadecane in CO₂ at 313 K and n-eicosane in CO₂ at 310 K. The solubility of n-octadecane in CO₂ at 313 K in the pressure range 10 to 18 MPa was determined in presence of 4.82 and 7.46 mol % of methanol, whereas the solubility of n-eicosane in CO₂ at 310 K in the pressure range 10 to 18 MPa was determined in presence of 5.23 and 7.43 mol % of methanol. The average solubility of n-octadecane in CO₂ was increased 102 % and 131 % with 4.82 and 7.46 mol % of methanol, respectively, while, the solubility of n-eicosane in CO₂ was enhanced 138 and 235 % with 5.23 and 7.43 mol % of methanol, respectively.

It is clear that methanol interacts strongly with the hydrocarbon and as a result the solubility of hydrocarbons in CO₂ is dramatically increased.